Chromatographic separation and characterization of asphaltene subfractions from Saudi Arabian crudes

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Abstract

Asphaltenes from two commercial Saudi Arabian crudes have been separated chromatographically into acids, bases and residue fractions, which were analysed by elemental analysis, ^{1}H and ^{13}C n.m.r. and i.r. spectroscopy. The acid fraction was obtained in the highest yield from both asphaltenes. The acids and bases from Arab Heavy asphaltenes had higher H/C ratios than those from Arab Berri asphaltenes. The highest content of nitrogen was found in the base fraction of Arab Heavy asphaltenes. N.m.r. spectra indicated a higher percentage of aromatic hydrogen atoms in Arab Berri base fractions, compared with those from Arab Heavy asphaltenes. The acid fraction from Arab Heavy asphaltenes contained more saturated carbon atoms and straight chain paraffin residues, the latter are of longer chain length. Various parameters for aromatic carbons (C_{ar}, $C_{ar,alk}$, $C_{ar,H}$ and $C_{ar,b}$) were calculated for the acid and base fractions of both asphaltenes. The percentages of aromatic carbons, C_{ar}, unsubstituted aromatic carbons, $C_{ar,H}$, and bridgehead carbons, $C_{ar,b}$ were all found to be greatest in the acid fraction from Arab Berri asphaltenes.

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